POSSIBLE MAFIC PATCHES IN SCOTT CRATER HIGHLIGHT THE NEED FOR RESOURCE EXPLORATION IN THE LUNAR SOUTH POLAR REGION. B. L. Cooper, Oceaneering Space Systems, 16665 Space Center Blvd., Houston TX (bcooper@oceaneering.com)

Introduction: Possible areas of mafic material on the rim and floor of Scott crater (82.1ºS, 48.5ºE) are suggested by analysis of shadow-masked Clementine false-color-ratio images [1]. Mafic materials common in mare and pyroclastic materials can produce more oxygen than can highlands materials [2], and mafic materials close to the south pole may be important for propellant production for a future lunar mission. If the dark patches are confirmed as mafic materials, this finding would suggest that other mafic patches may exist, even closer to the poles, which were originally mapped as purely anorthositic [3].

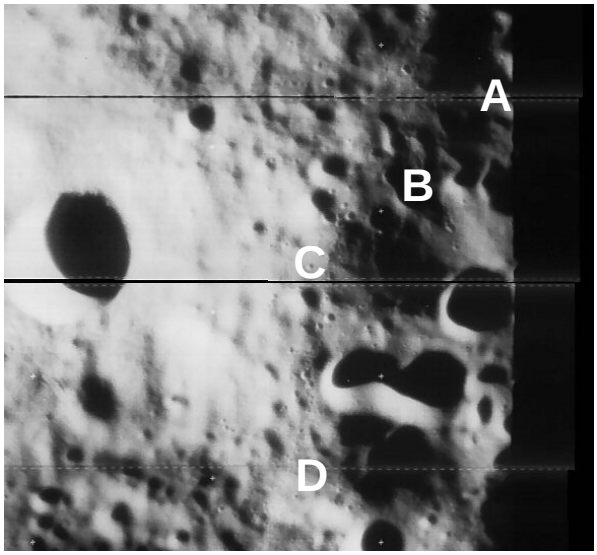

Figure 1. Lunar Orbiter IV Frame 118, showing the area that corresponds to the Clementine data in Figure 2.

Discussion and Interpretation: The image in Figure 2 was created by removing spurious data [4] from the false-color ratio image of an area along the northeastern edge of Scott crater [1]. The remaining color variations may be interpreted using the method provided by [5].

In the Lunar Orbiter visible-light image (Figure 1), the areas near letters "A" and "B" have a hummocky appearance and low albedo. The albedo contrast is noticeable between these areas and the crater floor material to the west. In the Clementine false-color-ratio image (Figure 2), these areas are indicated by yellow and orange pixels, suggesting high-Ti mafic materials or pyroclastic deposits [5, 6]. However, the orange area near "B" is more solidly colored and has a sharp edge, which makes its interpretation uncertain. The areas near the letters "C" and "D" show the largest amount of yellow color, which changes somewhat gradually to blue. If they were caused only by shadows, the color change would be abrupt. Moreover, they correspond to the areas of low albedo in Figure 1. However, parts of these areas should be ascribed to shadows, as seen by the sharpness of the transition at the crater rims, and the complete lack of features in the darkest areas.

Nevertheless, in both cases there are areas of low albedo extending beyond the shadows. In Figure 1, the left side of area "C" and the lower left edge of area "D" show topographic features, which would not be seen at all in a shadowed area, because lunar topography can only be seen when there is a direct light source. Thus it is reasonable that the yellow colors in these areas represent both shadows (near the craters) and pyroclastic deposits (distal to the craters).

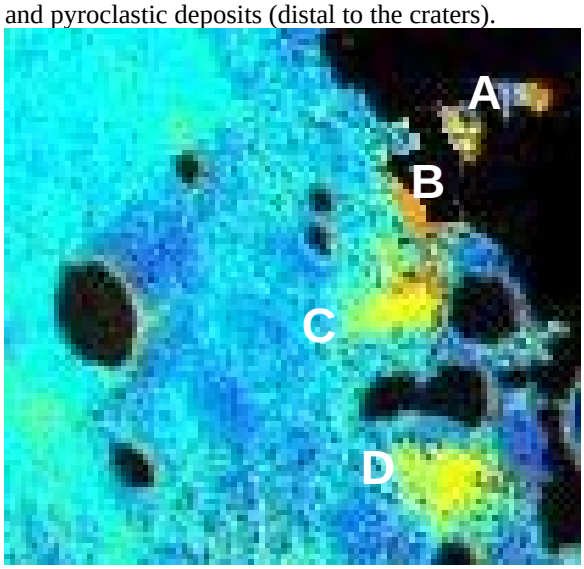

Figure 2. Clementine mosaic false-color data for the area along the northeast rim of Scott crater (82.1ºS,48.5ºE).

Conclusion: Additional high-resolution analyses are needed to confirm the nature of these patches, determine their extent, and provide details about their morphology. Confirmation of mafic materials in the lunar south polar region is important for lunar mission planning. The area along the northeast rim and floor of Scott crater, which shows evidence for drk, possibly mafic patches, should be selected for LRO High Resolution Imagery.

References: [1] Cooper B. L. (2007) LPSC 38th, Abstract #1377. [2] Allen, C. C. *et al.* (1994), *Space '94*, 1157-1166. [3] Wilhelms *et al.* (1979), *Map I–1162, USGS*. [4] Lucey *et al.* (1998) *JGR*, 103, 3679. [5] Pieters *et al.* (1994) *Science*, 266, 1844. [6] Farrand *et al.* (1999), *New Views of the Moon II*.